APPENDIX | PRINCIPLES OF THE NEW URBANISM

The Region, Metropolis, City, and Town

1. Metropolitan regions are finite places with geographic boundaries derived from topography, watersheds, coastlines, farmlands, regional parks, and river basins. The metropolis is made of multiple centers that are cities, towns, and villages, each with its own identifiable center and edges.

2. The metropolitan region is a fundamental economic unit of the contemporary world. Governmental cooperation, public policy, physical planning, and economic strategies must reflect this new reality.

3. The metropolis has a necessary and fragile relationship to its agrarian hinterland and natural landscapes. The relationship is environmental, economic, and cultural. Farmland and nature are as important to the metropolis as the garden is to the house.

4. Development patterns should not blur or eradicate the edges of the metropolis. Infill development within existing urban areas conserves environmental resources, economic investment, and social fabric, while reclaiming marginal and abandoned areas. Metropolitan regions should develop strategies to encourage such infill development over peripheral expansion.

5. Where appropriate, new development contiguous to urban boundaries should be organized as neighborhoods and districts, and be integrated with the existing urban pattern. Non-contiguous development should be organized as towns and villages with their own urban edges, and planned for a jobs/housing balance, not as bedroom suburbs.

6. The development and redevelopment of towns and cities should respect historical patterns, precedents, and boundaries.

7. Cities and towns should bring into proximity a broad spectrum of public and private uses to support a regional economy that benefits people of all incomes. Affordable housing should be distributed throughout the region to match job opportunities and to avoid concentrations of poverty.

8. The physical organization of the region should be supported by a framework of transportation alternatives. Transit, pedestrian, and bicycle systems should maximize access and mobility throughout the region while reducing dependence upon the automobile.

9. Revenues and resources can be shared more cooperatively among the municipalities and centers within regions to avoid destructive competition for tax base and to promote rational coordination of transportation, recreation, public services, housing, and community institutions.

The Neighborhood, the District and the Corridor

10. The neighborhood, the district, and the corridor are the essential elements of development and redevelopment in the metropolis. They form identifiable areas that encourage citizens to take responsibility for their maintenance and evolution.

11. Neighborhoods should be compact, pedestrian-friendly, and mixed-use. Districts generally emphasize a special single use, and should follow the principles of neighborhood design when possible. Corridors are regional connectors of neighborhoods and districts; they range from boulevards and rail lines to rivers and parkways.

12. Many activities of daily living should occur within walking distance, allowing independence to those who do not drive, especially the elderly and the young. Interconnected networks of streets should be designed to encourage walking, reduce the number and length of automobile trips, and conserve energy.

13. Within neighborhoods, a broad range of housing types and price levels can bring people of diverse ages, races, and incomes into daily interaction, strengthening the personal and civic bonds essential to an authentic community.

14. Transit corridors, when properly planned and coordinated, can help organize metropolitan structure and revitalize urban centers. In contrast, highway corridors should not displace investment from existing centers.

15. Appropriate building densities and land uses should be within walking distance of transit stops, permitting public transit to become a viable alternative to the automobile.

16. Concentrations of civic, institutional, and commercial activity should be embedded in neighborhoods and districts, not isolated in remote, single-use complexes. Schools should be sized and located to enable children to walk or bicycle to them.

17. The economic health and harmonious evolution of neighborhoods, districts, and corridors can be improved through graphic urban design codes that serve as predictable guides for change.

18. A range of parks, from tot-lots and village greens to ball fields and community gardens, should be distributed within neighborhoods. Conservation areas and open lands should be used to define and connect different neighborhoods and districts.

The Block, the Street and the Building

19. A primary task of all urban architecture and landscape design is the physical definition of streets and public spaces as places of shared use.

20. Individual architectural projects should be seamlessly linked to their surroundings. This issue transcends style.

21. The revitalization of urban places depends on safety and security. The design of streets and buildings should reinforce safe environments, but not at the expense of accessibility and openness.

22. In the contemporary metropolis, development must adequately accommodate automobiles. It should do so in ways that respect the pedestrian and the form of public space.

23. Streets and squares should be safe, comfortable, and interesting to the pedestrian. Properly configured, they encourage walking and enable neighbors to know each other and protect their communities.

24. Architecture and landscape design should grow from local climate, topography, history, and building practice.

25. Civic buildings and public gathering places require important sites to reinforce community identity and the culture of democracy. They deserve distinctive form, because their role is different from that of other buildings and places that constitute the fabric of the city.

26. All buildings should provide their inhabitants with a clear sense of location, weather and time. Natural methods of heating and cooling can be more resource-efficient than mechanical systems.

27. Preservation and renewal of historic buildings, districts, and landscapes affirm the continuity and evolution of urban society.

Walkability Audit - Summary

Prior to the design workshop, Walk Albuquerque and Alliance for Active Living organized a volunteer group to travel and evaluate the pedestrian world in the Central-Highland-Upper Nob Hill area. Three routes on Central, from Carlisle to San Mateo, were evaluated on two different Saturdays. This was a small sampling, with 6-7 people in each group, including area residents, business owners and members of the associations running the volunteer event. Participants familiar with this area noted that Saturday activity varies from weekday activity.

This type of analysis helped inform the design team as to the current state of affairs for the pedestrian, which is directly linked with the success of businesses in the area. A comment by one participant summed up the existing condition of the area for both folks on foot and for businesses in the area:

"I didn't think about the businesses at all. You just paid attention to the cars." (and the ground in front of your feet.)

Tally sheets with various criteria were given to participants. Results were tallied and the following general issues arose:

· Traffic: noise, fumes, speed, no buffer between sidewalk and cars in many places.
- Driver behavior: failure to yield to pedestrians, especially when turning.
· Sidewalks: broken sidewalks, rough surfaces, frequent driveways with steep side slopes, utility poles and other obstacles blocking the way. Very steep curb ramps that send walkers out into the traffic flow, uneven joints. Sidewalks too narrow to walk two abreast and pass anyone. No buffer between sidewalks and traffic lanes in many places.
· Street Crossings: timing on pedestrian crossing signals too short, intersections too wide, no really useful median refuges, parked cars block views at some intersections.
· Safety (real or perceived): barred windows, vacant lots, vast parking lots, vacant stores, locked front doors facing Central with signs to go around the back or side, no loitering signs, few other pedestrians out - of those we saw, some were perceived of as "scary".
· Buildings and land use: Many buildings are designed for cars, with large parking lots facing Central along the sidewalk, multiple driveways crossing sidewalks, entrances oriented to parking lots, rather than sidewalks. The block west of the Highland theater was the worst in total lack of pedestrian accommodations.
- Many vacant parcels and vacant buildings
- Vast no man's land south of the theater, and around Highland High School
- Very little residential within the MRA boundaries
- Highland Theater is a definite positive, as well as a few other isolated and short segments, where businesses with interesting facades were close to the sidewalk and on-street parking provided a buffer for pedestrians.
· Aesthetics and amenities: dirt, litter, graffiti, few trees, benches, trash receptacles, etc.
· Central has an active bus route, but bus stops generally lacked amenities. Few benches (standard issue grey recycled plastic) or trash receptacles, no shade or shelter.
· We weren't considering bicycles with this audit, but we noted several bicycles competing with pedestrians for space on narrow sidewalks, and no bike parking facilities.

Client: City of Albuquerque Planning Department
Albuquerque, New Mexico

Your Name (please print): IIII II

How Walkable is the Nob Hill /Highland Area?

Directions: Use this survey form to record your opinions and observations as you walk through the Nob Hill/ Hiland area. Please follow your specified route *exactly* as shown on the map. If you have a camera, use it to record images of things that you like or don't like. Be sure to record the location of each photograph on the map. Also feel free to use the map to mark problem locations or record any other useful notes.

ROUTE #2: Your starting location is the northeast corner of Monroe & Copper

Day & date:	Start time:	End time:	Weather:
2/7/04 Sat.	9:40	10:45	cold Cloudy

Segment #1: Cross to the south side of Copper, staying on the east side of Monroe

How difficult or easy was it to cross the street at this location? (please check only one)

☐ Extremely difficult ☐ Very difficult IIII☐ Somewhat difficult II☐ Somewhat easy I☐ Very easy ☐ Extremely easy

How safe did you feel crossing the street at this location? (please check only one)

☐ Extremely unsafe ☐ Very unsafe I☐ Somewhat unsafe IIII☐ Somewhat safe II ☐ Very safe ☐ Extremely safe

If you experienced problems crossing the street, please indicate which types (check all that apply):

Getting from Sidewalk to the Street:
- I☐ Curb ramp(s) not available
- I☐ Curb ramp(s) not in line with sidewalk
- III☐ Curb ramp(s) lead into active auto travel lane
- I☐ Curb ramp(s) too steep
- I☐ Level landing not available at top of curb ramp(s)
- I☐ Transition from curb ramp(s) to street is rough/ uneven

In the Street:
- IIII☐ Crosswalk is not marked
- III☐ Pavement is rough or uneven
- ☐ Roadway is too wide
- ☐ Traffic signal does not give enough time to cross
- ☐ Drivers fail to yield to pedestrians in crosswalk
- ☐ Drivers don't look for pedestrians when making turns

Other:
- IIII☐ No pedestrian crossing signal
- ☐ Long wait at traffic signal
- ☐ Pedestrian push button is difficult to find/ hard to reach
- ☐ Pedestrian push button on traffic signal does not work
- I☐ Curbed median refuge is not available
- ☐ Parked cars block view of traffic
- ☐ Other obstructions block view of traffic
- ☐ Other: I - fast traffic on Copper - barrier on Monroe is unsightly - nothing to slow traffic, ie. Stop signs, as far as eye can see - in one location, wheelchair had to track over steep curb - very light traffic - turning cars don't yield

Your Name (please print): _____

Segment #3: Walk east along the north side of Central, from Monroe to San Mateo

Overall, how pleasant was your walk over this segment of the route? (please check only one)

☐ Extremely unpleasant ☐ Very unpleasant IIII☐ Somewhat unpleasant II☐ Somewhat pleasant ☐ Very pleasant ☐ Extremely pleasant

If you were alone, how safe would you feel walking here during the day? (please check only one)

☐ Extremely unsafe ☐ Very unsafe I☐ Somewhat unsafe (from traffic) IIII☐ Somewhat safe I☐ Very safe ☐ Extremely safe

What sorts of things did you like walking along this segment? (check all that apply)
- ☐ People met or passed along the way
- ☐ Friendly dogs/ cats
- II☐ Businesses / shop widows (I bead store/ shoe store Bank of Alb New Chinese Rest)
- I☐ Building design or placement
- I☐ Trees along sidewalk or pathway
- ☐ Paving materials/ patterns of sidewalk or pathway
- I☐ Other: sunshine increase in rentals - stores

What sorts of things did you NOT like? (check all that apply)
- II☐ Dirty sidewalk
- I☐ Litter or trash
- I☐ Graffiti on bus bench
- ☐ Scary people
- ☐ Scary dogs
- II☐ Unpleasant businesses (closed dirty windows)
- I☐ Buildings designed for cars, not pedestrians
- II☐ Buildings in poor condition
- IIII☐ Bus stops not well designed or maintained
- IIII☐ Not enough trees or other vegetation
- IIII☐ Not enough shelter from sun, rain, wind, etc.
- IIII☐ No place to sit (e.g., benches, etc.)
- IIII☐ Traffic too close to sidewalk
- IIII☐ Traffic moves too fast
- IIII☐ Traffic noise
- IIII☐ Vehicle exhaust fumes
- ☐ Other: board up bldgs.

Did you encounter any obstacles or obstructions? If so, please indicate the types of obstacles or obstructions you encountered (check all that apply):

Along Side of Roadway:
- I☐ Sidewalk is not continuous (or not available at all)
- III☐ Sidewalk is too narrow
- IIII☐ Sidewalk is cracked, falling apart, etc.
- ☐ Sidewalk is blocked by fixed objects (e.g., poles, fire hydrants, signs, shrubbery, etc.)
- IIII☐ Sidewalk is blocked by moveable objects (e.g., trash dumpsters, automobiles, etc.) ladder
- ☐ Water pools on the sidewalk
- II☐ Sidewalk is too steep along the direction of travel
- III☐ Sidewalk has awkward "cross slopes" at driveway entrances or elsewhere
- ☐ Other: very steep & uneven sidewalk - especially unsightly between Quincy & Monroe • No bench or shelter at bus stop • businesses not open during posted hours • corners especially difficult in wheelchair • no ramps @ driveways/ poor transitions

At Minor-Road Intersections:
- ☐ Curb ramp(s) not available
- ☐ Curb ramp(s) not in line with sidewalk
- II☐ Curb ramp(s) lead into active auto travel lane
- IIII☐ Curb ramp(s) too steep
- ☐ Level landing not available at top of curb ramp(s)
- IIII☐ Transition from curb ramp(s) to street is rough/ uneven
- I☐ Rough or uneven street pavement
- ☐ Other: cars not yielding to peds

Sample score cards used by walkability volunteers

Traffic Considerations:

The focus of the Street and sidewalk designs are to slow traffic down while increasing capacity of traffic volume on Central Ave.. The safety and aesthetics of the pedestrian environment [and also the economic environment] should be as important as the considerations given to vehicles in the area, if not more so. Some parameters of the design:

1. Pedestrian crossing times must be kept to a minimum. Crossing times of 19 seconds or less are preferred. This represents a street with four 12 foot wide lanes.
2. Vehicle speeds must be kept to 20 miles per hour or less generally, and around 30 miles per hour on primary thoroughfares.
3. Pedestrians should be protected from the elements as much as practical.
4. Streets should be defined by buildings at their edges.
5. The street must accommodate bicyclists and the handicapped.
6. Transit must be a part of thoroughfare planning.
7. Parking standards must be reduced to reflect historically supported demand for traditional urbanism.
8. Central is the main artery for the project and needs special attention.

The design of Central Avenue is informed by several elements listed as follows;
1. A LRT or BRT system may be introduced into the corridor. This would require a 26 foot wide path in the center of the street. To allow for this potential, a 26 foot wide median is proposed as one of the cross section scenarios.

2. The intersection of Central and San Mateo is operating at LOS F with more than 4,000 vehicles at PM peak hour times. This study proposes that a 2 lane roundabout be built in the intersection. This will provide better access for non-motorists, boost the LOS to B, reduce accidents and will allow some civic art in the center punctuation this area of the neighborhood. See traffic model output in later pages this appendix.

3. The other signalized intersections along Central operate in the low to mid 30,000 ADT range. For the above stated reasons, each intersection could have a single lane roundabout with 2 approach lanes and one exit lane. The LOS would be B and they would upgrade existing signal performance characteristics. Samples of possible design for two intersections are illustrated as follows;

It should be noted that the 26 foot wide median is shown at Washington, but not San Mateo. An 18 foot increase to the median width can be achieved and work well with a 2 lane roundabout.

Slower traffic speeds are critical for safety in this corridor. A combination of on-street parking, narrower street designs, bulb-outs, street trees, and roundabouts are proposed to keep traffic at posted speeds throughout the area. The following table shows in graphic detail the repercussions of pedestrian/automobile collisions as they relate to automobile speed:

Selected Sample of Injuries by the Abbreviated Injury Scale (AIS) AIS Code Injury Severity Level and Selected Injuries

1 (14 mph) Minor Superficial abrasion or laceration of skin; digit sprain; first-degree burn; head trauma with headache or dizziness (no other neurological signs).
2 (20 mph) Moderate Major abrasion or laceration of skin; cerebral concussion (unconscious less than 15 minutes); finger or toe crush/amputation; closed pelvic fracture with or without dislocation.

3 (25 mph) Serious Major nerve laceration; multiple rib fracture (but without flail chest); abdominal organ contusion; hand, foot, or arm crush/amputation.

4 (29 mph) Severe Spleen rupture; leg crush; chest-wall perforation; cerebral concussion with other neurological signs (unconscious less than 24 hours).

5 (33 mph) Critical Spinal cord injury (with cord transection); extensive second- or third-degree burns; cerebral concussion with severe neurological signs (unconscious more than 24 hours).

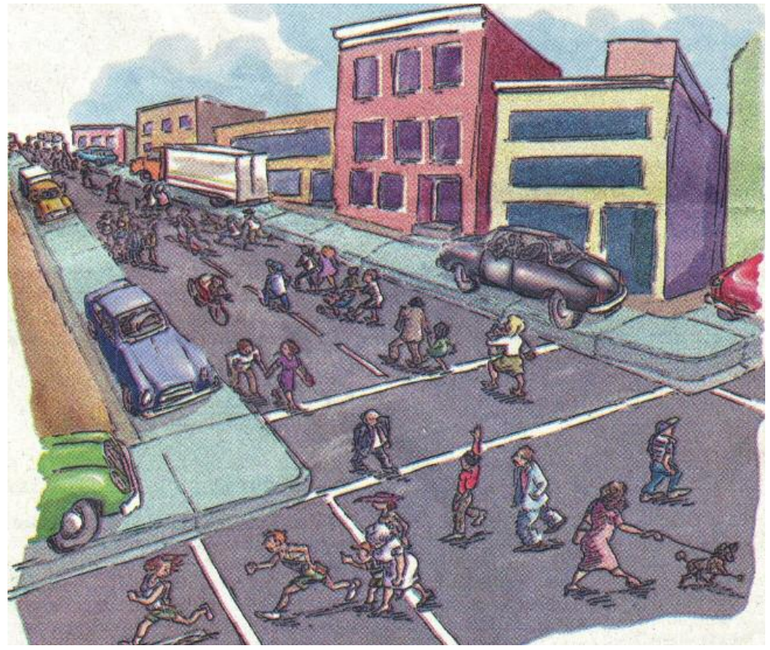
6 (36 mph) Fatal Injuries which although not fatal within the first 30 days after an accident, ultimately result in death .

WTP Values Per AIS Injury Level (2001 dollars)
AIS Code Description of Injury Fraction of WTP Value of Life
WTP Value

AIS 1 Minor	0.20 Percent	$6,000
AIS 2 Moderate	1.55 Percent	$46,500
AIS 3 Serious	5.75 Percent	$172,500
AIS 4 Severe	18.75 Percent	$562,500
AIS 5 Critical	76.25 Percent	$2,287,500
AIS 6 Fatal	100.00 Percent	$3,000,000

As can be seen, the costs increase exponentially with speed. Tax dollars are spent every year to treat uninsured accident victims and the fiscal costs are sometimes excessive.

Narrow lanes, transit mixed in traffic, wide sidewalks



Balancing people and cars in an environment

APPENDIX | TRAFFIC ENGINEERING
SIDRA ROUNDABOUT OUTPUT

CENTRAL AND WASHINGTON

Degree of saturation (highest)	= 0.636
Practical Spare Capacity (lowest)	= 34 %
Total vehicle flow (veh/h)	= 3369
Total vehicle capacity, all lanes (veh/h)	= 5995
Average intersection delay (s)	= 14.2
Largest average movement delay (s)	= 32.4
Total vehicle delay (veh-h/h)	= 13.26
Largest back of queue, 95% (ft)	= 169
Performance Index	= 56.50
Intersection Level of Service	= B
Worst movement Level of Service	= C

SAN MATEO AND CENTRAL

Degree of saturation (highest)	= 0.861
Practical Spare Capacity (lowest)	= -1 %
Total vehicle flow (veh/h)	= 5233
Total vehicle capacity, all lanes (veh/h)	= 7039
Average intersection delay (s)	= 17.1
Largest average movement delay (s)	= 20.3
Total vehicle delay (veh-h/h)	= 24.91
Largest back of queue, 95% (ft)	= 264
Performance Index	= 108.27
Intersection Level of Service	= B
Worst movement Level of Service	= C

Akcelik & Associates Pty Ltd - SIDRA 5.30
Swift and Associates
Longmont Registered User No. LKWHEF
Time and Date of Analysis 3:49 PM, Feb 27,2004
Central Na Washington, ABQ * CENWASPM
PM Peak Hour
Intersection ID: 1
SIDRA US Highway Capacity Manual Version Roundabout

RUN INFORMATION

* Basic Parameters:
Intersection Type: Roundabout
Driving on the right-hand side of the road
SIDRA US Highway Capacity Manual Version
Input data specified in US units
Default Values File No. 11
Peak flow period (for performance): 15 minutes
Unit time (for volumes): 60 minutes (Total Flow Period)
Delay definition: Control delay
Geometric delay included
Delay formula: Highway Capacity Manual
Level of Service based on: Delay (HCM)
Queue definition: Back of queue, 95th_Percentile

Table S.0 - TRAFFIC FLOW DATA (Flows in veh/hour as used by the program)

Mov No.	Left LV	Left HV	Through LV	Through HV	Right LV	Right HV	Flow Scale	Peak Flow Factor
West: West Approach								
12	91	2	1227	24	42	1	1.00	0.90
South: South Approach								
32	33	1	266	5	63	1	1.00	0.90
East: East Approach								
22	82	2	1056	22	25	1	1.00	0.90
North: North Approach								
42	52	1	279	6	84	2	1.00	0.90

Based on unit time = 60 minutes.
Flow Scale and Peak Hour Factor effects included in flow values.

Table R.0 - ROUNDABOUT BASIC PARAMETERS

Cent Island Diam (ft)	Circ Width (ft)	Insc Diam. (ft)	No.of Circ. Lanes	No.of Entry Lanes	Av.Ent Lane Width (ft)	Circulating/Exiting Stream Flow (veh/h)	%HV	Adjust. Flow (pcu/h)	%Exit Incl.	Cap. Constr. Effect
West: West Approach										
64	20	104	1	2	16.00	421	2.0	421	0	N
South: South Approach										
64	20	104	1	2	16.00	1399	2.0	1399	0	N
East: East Approach										
64	20	104	1	2	16.00	98	2.0	398	0	N
North: North Approach										
64	20	104	1	2	16.00	1194	2.0	1194	0	N

Central Na Washington, ABQ * CENWASPM
PM Peak Hour
Intersection ID: 1 Roundabout

Table R.1 - ROUNDABOUT GAP ACCEPTANCE PARAMETERS

Turn	Lane No.	Lane Type	Circ/ Exit Flow (pcu/h)	Intra-Bunch Headway (s)	Prop. Bunched Vehicles	Critical Gap (s)	Follow Up Headway (s)
West: West Approach							
Left	1	Dominant	421	2.00N	0.443	3.17	2.04
Thru	1	Dominant	421	2.00N	0.443	3.17	2.04
	2	Subdominant	421	2.00N	0.443	3.69	2.38
Right	2	Subdominant	421	2.00N	0.443	3.69	2.38
South: South Approach							
Left	1	Subdominant	1399	2.00N	0.857	2.94	2.25
Thru	1	Subdominant	1399	2.00N	0.857	2.94	2.25
	2	Dominant	1399	2.00N	0.857	2.41	1.85
Right	2	Dominant	1399	2.00N	0.857	2.41	1.85
East: East Approach							
Left	1	Dominant	398	2.00N	0.424	3.21	2.06
Thru	1	Dominant	398	2.00N	0.424	3.21	2.06
	2	Subdominant	398	2.00N	0.424	3.72	2.39
Right	2	Subdominant	398	2.00N	0.424	3.72	2.39
North: North Approach							
Left	1	Subdominant	1194	2.00N	0.810	3.00	2.30
Thru	1	Subdominant	1194	2.00N	0.810	3.00	2.30
	2	Dominant	1194	2.00N	0.810	2.52	1.93
Right	2	Dominant	1194	2.00N	0.810	2.52	1.93

N The number of circulating lanes specified in front of this approach ("No. of circ. lanes" in Roundabout Data screen) is less than the number of lanes effectively used when the entry flows that constitute the circulating flow are considered. Intra-bunch headway for the circulating stream has been set to a higher value as a result.

Table R.5 - ROUNDABOUT CAPACITY & LEVEL OF SERVICE - SIDRA & HCM MODELS

Mov No.	Arv Flow (veh /h)	SIDRA Cap. (veh /h)	Deg. Satn x	Av. Delay (sec)	LOS	HCM Lower Cap. (veh /h)	Deg. Satn x	Av. Delay (sec)	LOS	HCM Upper Cap. (veh /h)	Deg. Satn x	Av. Delay (sec)	LOS
West: West Approach													
12 LTR	1388	2264	0.613	10.9	B	1617	0.858	19.4	B	1988	0.698	13.4	B
		2264	0.613	10.9	B	1617	0.858	19.4	B	1988	0.698	13.4	B
South: South Approach													
32 LTR	369	580	0.636	32.4	C	- - - - NA - - - -				- - - - NA - - - -			
		580	0.636	32.4	C	- - - - NA - - - -				- - - - NA - - - -			
East: East Approach													
22 LTR	1188	2287	0.519	10.0	A	1650	0.720	14.4	B	2025	0.587	11.5	B
		2287	0.519	10.0	A	1650	0.720	14.4	B 2	025	0.587	11.5	B
North: North Approach													
42 LTR	424	864	0.491	20.8	C	808	0.525	32.6	C	1060	0.400	26.2	C
		864	0.491	20.8	C	808	0.525	32.6	C	1060	0.400	26.2	C
ALL VEHICLES:		5995	0.636	14.2	B	- - - - NA - - - -				- - - - NA - - - -			

NA Values for this roundabout capacity model have not been calculated because the model was not applicable for the given roundabout conditions. Note that the HCM models are only applicable to single-lane roundabouts with circulating flows less than 1200 veh/h. Also note that results are not calculated for any of the models for slip lane or continuous movements. See SIDRA Output Guide Appendix Section A3.8 for roundabout limits.

Table S.2 - MOVEMENT CAPACITY PARAMETERS

Mov No.	Arv Flow (veh /h)	Total Opng Flow (veh/h)	%HV	Adjust. Opng Flow (pcu/h)	Total Cap. (veh /h)	Prac. Deg. Satn xp	Prac. Spare Cap. (%)	Lane Util (%)	Deg. Satn x
West: West Approach									
12 LTR	1388	421	2.0	421	2264	0.85	39	100	0.613
South: South Approach									
32 LTR	369	1399	2.0	1399	580	0.85	34	100	0.636*
East: East Approach									
22 LTR	1188	398	2.0	398	2287	0.85	64	100	0.519
North: North Approach									
42 LTR	424	1194	2.0	1194	864	0.85	73	100	0.491

Table S.3 - INTERSECTION PARAMETERS

Degree of saturation (highest)	=	0.636
Practical Spare Capacity (lowest)	=	34 %
Total vehicle flow (veh/h)	=	3369
Total vehicle capacity, all lanes (veh/h)	=	5995
Average intersection delay (s)	=	14.2
Largest average movement delay (s)	=	32.4
Total vehicle delay (veh-h/h)	=	13.26
Largest back of queue, 95% (ft)	=	169
Performance Index	=	56.50
Total fuel (ga/h)	=	29.7
Total cost ($/h)	=	266.67
Intersection Level of Service	=	B
Worst movement Level of Service	=	C

Table S.5 - MOVEMENT PERFORMANCE

Mov No.	Total Delay (veh-h/h)	Aver. Delay (sec)	Prop. Queued	Eff. Stop Rate	Longest Queue 95% Back (vehs)	(ft)	Perf. Index	Aver. Speed (mph)
West: West Approach								
12 LTR	4.20	10.9	0.59	0.77	5.6	143	19.83	16.5
South: South Approach								
32 LTR	3.32	32.4	0.91	1.34	6.7	169	11.72	9.1
East: East Approach								
22 LTR	3.29	10.0	0.53	0.70	3.8	97	15.54	16.8
North: North Approach								
42 LTR	2.45	20.8	0.85	1.10	4.1	104	9.40	12.0

Table S.5 - MOVEMENT PERFORMANCE

Mov No.	Total Delay (veh-h/h)	Aver. Delay (sec)	Prop. Queued	Eff. Stop Rate	Longest Queue 95% Back (vehs)	(ft)	Perf. Index	Aver. Speed (mph)
West: West Approach								
12 LTR	4.20	10.9	0.59	0.77	5.6	143	19.83	16.5
South: South Approach								
32 LTR	3.32	32.4	0.91	1.34	6.7	169	11.72	9.1
East: East Approach								
22 LTR	3.29	10.0	0.53	0.70	3.8	97	15.54	16.8
North: North Approach								
42 LTR	2.45	20.8	0.85	1.10	4.1	104	9.40	12.0

Table S.6 - INTERSECTION PERFORMANCE

Total Flow (veh/h)	Total Delay (veh-h/h)	Aver. Delay (sec)	Prop. Queued	Eff. Stop Rate	Perf. Index	Aver. Speed (mph)
West: West Approach						
1388	4.20	10.9	0.591	0.77	19.83	16.5
South: South Approach						
369	3.32	32.4	0.912	1.34	11.72	9.1
East: East Approach						
1188	3.29	10.0	0.532	0.70	15.54	16.8
North: North Approach						
424	2.45	20.8	0.856	1.10	9.40	12.0
INTERSECTION:						
3369	13.26	14.2	0.639	0.85	56.50	14.6

Table S.7 - LANE PERFORMANCE

Lane No.	Mov No.	Arv Flow (veh /h)	Cap (veh /h)	Deg. Satn x	Aver. Delay (sec)	Eff. Stop Rate	Queue 95% Back (vehs)	(ft)	Short Lane (ft)
West: West Approach									
1 LT	12	757	1235	0.613	10.6	0.74	5.6	141	
2 TR	12	631	1028	0.613	11.2	0.79	5.6	143	
South: South Approach									
1 LT	32	158	249	0.636	34.6	1.31	5.6	143	
2 TR	32	211	332	0.636	30.7	1.36	6.7	169	
East: East Approach									
1 LT	22	646	1244	0.519	9.8	0.69	3.8	97	
2 TR	22	542	1044	0.519	10.1	0.72	3.7	95	
North: North Approach									
1 LT	42	187	381	0.491	22.3	1.10	3.7	94	
2 TR	42	237	483	0.491	19.7	1.10	4.1	104	

Table S.8 - LANE FLOW AND CAPACITY INFORMATION

Lan No.	Mov No.	Arv Flow (veh/h) Lef	Thru	Rig	Tot	Lane Width (ft)	Saturation Adj. Basic (tcu)	Aver 1st (veh)	Flow Aver 2nd (veh)	Min Cap (veh /h)	Tot Cap (veh /h)	Deg. Satn x	Lane Util %
West: West Approach													
1 LT	12	93	664	0	757	16.0N	-	-	-	60	1235	0.613	100
2 TR	12	0	588	43	631	16.0N	-	-	-	60	1028	0.613	100
South: South Approach													
1 LT	32	34	124	0	158	16.0N	-	-	-	60	249	0.636	100
2 TR	32	0	147	64	211	16.0N	-	-	-	60	332	0.636	100
East: East Approach													
1 LT	22	84	562	0	646	16.0N	-	-	-	60	1244	0.519	100
2 TR	22	0	516	26	542	16.0N	-	-	-	60	1044	0.519	100
North: North Approach													
1 LT	42	53	134	0	187	16.0N	-	-	-	60	381	0.491	100
2 TR	42	0	151	86	237	16.0N	-	-	-	60	483	0.491	100

N Width value was not used for saturation flow adjustment in this case. (Lane width adjustment does not apply at sign-controlled intersections or to gap-acceptance capacities at signalised intersections).
Basic Saturation Flow in this table is adjusted for lane width, approach grade, parking manoeuvres and number of buses stopping. Saturation flow scale applies if specified.

Table S.14 - SUMMARY OF INPUT AND OUTPUT DATA

Lane No.	Arrival Flow (veh/h) L	T	R	Tot	HV %	Adj. Basic Satf.	Eff Grn (secs) 1st	2nd	Deg Sat x	Aver. Delay (sec)	95% Queue (ft)	Shrt Lane (ft)
West: West Approach												
1 LT	230	248	0	478	2				0.688	15.6	140	
2 T	0	410	0	410	2				0.688	15.5	131	
3 TR	0	276	134	410	2				0.688	15.0	131	
	230	934	134	1298	2				0.688	15.4	140	
South: South Approach												
1 LT	188	278	0	466	2				0.685	14.9	126	
2 T	0	395	0	395	2				0.685	15.0	118	
3 TR	0	261	134	395	2				0.685	14.4	118	
	188	934	134	1256	2				0.685	14.8	126	
East: East Approach												
1 LT	341	240	0	581	2				0.860	20.3	264	
2 T	0	491	0	491	2				0.860	20.4	243	
3 TR	0	283	208	491	2				0.860	19.7	243	
	341	1015	208	1564	2				0.860	20.2	264	
North: North Approach												
1 LT	174	172	0	346	2				0.744	19.0	140	
2 T	0	346	0	346	2				0.744	18.0	140	
3 TR	0	227	195	422	2				0.744	16.1	154	
	174	746	195	1115	2				0.744	17.6	154	

ALL VEHICLES	Tot Arv.	% HV	Max X	Aver. Delay	Max Queue
	5233	2	0.861	17.1	264

Total flow period = 60 minutes. Peak flow period = 15 minutes.

Note: Basic Saturation Flows are not adjusted at roundabouts or sign-controlled intersections and apply only to continuous lanes.
Values printed in this table are back of queue.

Table S.15 - CAPACITY AND LEVEL OF SERVICE (HCM STYLE)

Mov No.	Mov Typ	Total Flow (veh /h)	Total Cap. (veh /h)	Deg. of Satn (v/c)	Aver. Delay (sec)	LOS
West: West Approach						
12 L		230	334	0.689	15.6	B
11 T		934	1358	0.688	15.4	B
13 R		134	195	0.687	15.0	B
		1298	1887	0.689	15.4	B
South: South Approach						
32 L		188	275	0.684	14.9	B
31 T		934	1364	0.685	14.8	B
33 R		134	196	0.684	14.4	B
		1256	1835	0.685	14.8	B
East: East Approach						
22 L		341	396	0.861*	20.3	C
21 T		1015	1180	0.860	20.2	C
23 R		208	242	0.860	19.7	B
		1564	1818	0.861	20.2	C
North: North Approach						
42 L		174	234	0.744	19.0	B
41 T		746	1003	0.744	17.7	B
43 R		195	262	0.744	16.1	B
		1115	1499	0.744	17.6	B
ALL VEHICLES:		5233	7039	0.861	17.1	B
INTERSECTION:		5233	7039	0.861	17.1	B

Level of Service calculations are based on
average control delay including geometric delay (HCM criteria),
independent of the current delay definition used.
For the criteria, refer to the "Level of Service" topic in
the SIDRA Output Guide or the Output section of the on-line help.
* Maximum v/c ratio, or critical green periods

Table D.1 - LANE DELAYS

Lane Control No.	Mov No.	Deg. Satn x	Stop-line Delay 1st d1	2nd d2	Total dSL	Acc. Dec. dn	Queuing Total dq	MvUp dqm	Stopd (Idle) di	Geom dig	dic
West: West Approach											
1 LT	12, 11	0.688	4.7	2.4	7.1 7.6	3.7	3.4	3.3	0.1	9.6	15.6
2 T	11	0.688	5.3	2.5	7.9	3.7	4.2	3.3	0.9	7.6	15.5
3 TR	11, 13	0.688	5.3	2.5	7.9 6.1	3.7	4.2	3.3	0.9	7.6	15.0
South: South Approach											
1 LT	32, 31	0.685	4.4	2.1	6.5 7.6	3.5	2.9	2.9	0.0	9.6	14.9
2 T	31	0.685	5.0	2.3	7.3	3.6	3.7	3.2	0.6	7.6	15.0
3 TR	31, 33	0.685	5.0	2.3	7.3 6.1	3.6	3.7	3.2	0.6	7.6	14.4
East: East Approach											
1 LT	22, 21	0.860	5.3	6.3	11.6 7.6	3.9	7.6	7.6	0.1	9.6	20.3
2 T	21	0.860	6.0	6.8	12.8	4.0	8.7	7.5	1.3	7.6	20.4
3 TR	21, 23	0.860	6.0	6.8	12.8 6.1	4.0	8.7	7.5	1.3	7.6	19.7
North: North Approach											
1 LT	42, 41	0.744	6.4	4.0	10.4 7.6	3.9	6.5	4.8	1.7	9.6	19.0
2 T	41	0.744	6.4	4.0	10.4	3.9	6.5	4.8	1.7	7.6	18.0
3 TR	41, 43	0.744	5.5	3.7	9.2 6.1	3.8	5.4	4.9	0.5	7.6	16.1

dn is average stop-start delay for all vehicles queued and unqueued

Table D.3 - LANE QUEUES

Lane No.	Deg. Satn x	Ovrfl. Queue No	Average Nb1	Nb2	Nb	Percentile 70%	85%	90%	95%	98%	Stor. Ratio
West: West Approach											
1 LT	0.688	0.5	1.1	0.7	1.8	3.2	3.9	4.4	5.5	6.4	0.47
2 T	0.688	0.5	1.0	0.7	1.7	3.0	3.7	4.2	5.2	6.0	0.44
3 TR	0.688	0.5	1.0	0.7	1.7	3.0	3.7	4.2	5.2	6.0	0.44
South: South Approach											
1 LT	0.685	0.4	1.0	0.6	1.6	2.9	3.5	4.0	4.9	5.8	0.42
2 T	0.685	0.4	0.9	0.6	1.5	2.7	3.3	3.7	4.6	5.4	0.39
3 TR	0.685	0.4	0.9	0.6	1.5	2.7	3.3	3.7	4.6	5.4	0.39
East: East Approach											
1 LT	0.860	1.4	1.4	2.2	3.5	5.8	7.2	8.3	10.4	12.2	0.88
2 T	0.860	1.3	1.3	1.9	3.2	5.4	6.7	7.6	9.6	11.2	0.81
3 TR	0.860	1.3	1.3	1.9	3.2	5.4	6.7	7.6	9.6	11.2	0.81
North: North Approach											
1 LT	0.744	0.6	0.9	0.9	1.8	3.2	3.9	4.4	5.5	6.4	0.47
2 T	0.744	0.6	0.9	0.9	1.8	3.2	3.9	4.4	5.5	6.4	0.47
3 TR	0.744	0.6	1.0	1.0	2.0	3.5	4.3	4.9	6.1	7.1	0.51

Values printed in this table are back of queue.

Central and San Mateo, ABQ CENSANPM
PM Peak Hour, City Data
Intersection ID: 1
Roundabout

Table D.4 - MOVEMENT SPEEDS (mph)

Mov No.	App. Speeds Cruise	Negn	Exit Speeds Negn	Cruise	Queue Move-up 1st Grn	2nd Grn	Av. Section Spd Running	Overall
West: West Approach								
12	28.0	14.0	14.0	28.0	11.1		14.7	14.6
11	28.0	14.0	14.0	28.0	10.8		14.7	14.4
13	28.0	14.0	14.0	28.0	10.6		14.8	14.3
South: South Approach								
32	28.0	14.0	14.0	28.0	10.9		14.9	14.9
31	28.0	14.0	14.0	28.0	10.5		14.9	14.7
33	28.0	14.0	14.0	28.0	10.4		14.9	14.6
East: East Approach								
22	28.0	14.0	14.0	28.0	10.9		12.9	12.9
21	28.0	14.0	14.0	28.0	10.5		12.8	12.5
23	28.0	14.0	14.0	28.0	10.4		12.7	12.2
North: North Approach								
42	28.0	14.0	14.0	28.0	10.0		14.0	13.3
41	28.0	14.0	14.0	28.0	10.2		13.9	13.4
43	28.0	14.0	14.0	28.0	10.6		13.9	13.7

"Running Speed" is the average speed excluding stopped periods.

END

Client: City of Albuquerque Planning Department
Albuquerque, New Mexico